Overview

The HP StorageWorks P2000 G3 FC Modular Smart Array (P2000 G3 FC) is the newest Fibre Channel model of Hewlett Packard's 2000 family of storage arrays (which include the MSA2000i G2 iSCSI and the MSA2000sa G2 SAS connected models), specifically designed for entry-level customers and features the very latest in functionality and 8Gb technology at highly affordable price points. These storage solutions offer excellent price/performance and availability features for direct attach configurations (depending on OS), clusters, workgroups and entry-level SAN environments. Each solution is designed to be easy to deploy, to be secure, along with low management costs, while driving rapid return on investment.

The P2000 G3 FC is an 8 Gb Fibre Channel connected 2U storage area network (SAN) or direct connect solution (OS dependent) designed for small to medium size departments or remote locations. It offers a choice of two controllers. The first is a high-performance, Fibre Channel 8 Gb dual port model. The second is a unique dual-purpose Combo controller with two 8 Gb Fibre Channel ports with the addition of two 1GbE iSCSI ports. A P2000 G3 FC Array can have one or two of the same controller. Access to the enclosures and drives is at the new faster speed of 6Gb SAS.

The optional dual-protocol P2000 G3 MSA FC/iSCSI Combo Controller gives exceptional flexibility. The 8 Gb FC ports support a full FC SAN while the two 1GbE iSCSI ports can serve two purposes.

- economically share the array storage resource with a smaller department accessing it through iSCSI
- enable the new optional Remote Snap functionality over iSCSI protocol

The controller-less chassis is offered in two models - one comes standard with twelve Large Form Factor (LFF) 3.5-inch drive bays, the other can accommodate twenty-four Small Form Factor (SFF) 2.5-inch drives. Both are able to simultaneously support enterprise-class SAS drives and archival-class SATA Midline drives. The SFF chassis also supports SAS Midline drives. Either chassis can have one or two P2000 G3 FC or FC/iSCSI Combo controllers.

HP's modular approach to the entry level enables incremental customer purchases, allowing the array to grow as needs grow thus allowing a maximum return on investment. Choose a single controller unit for low initial cost with the ability to upgrade later; or decide on a model with dual controllers for the most demanding entry-level situations. There are no additional charges, licenses or fees as you add enclosures or hosts and users.

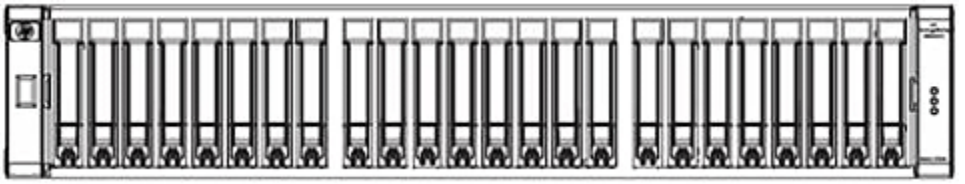
Capacity can easily be added as the need develops by attaching additional drive enclosures. Maximum capacity ranges with LFF drives up to 57.6 TB SAS or 192 TB SATA with the addition of the maximum number of drive enclosures. Configurations utilizing the SFF drive chassis and the maximum number of drive enclosures can grow to 44.7 TB of SAS or 74.5 TB of SAS Midline or SATA Midline with a total of 149 SFF drives. The P2000 G3 FC has been fully tested up to 64 hosts.

Significant data protection advances are delivered only by the new P2000 G3 arrays. First, the units come STANDARD with sixty-four snapshot capability at no extra cost. There is also now a new option of five hundred and twelve snaps. In a further move to protect the user's data, optional Remote Snap capability is offered for the first time.

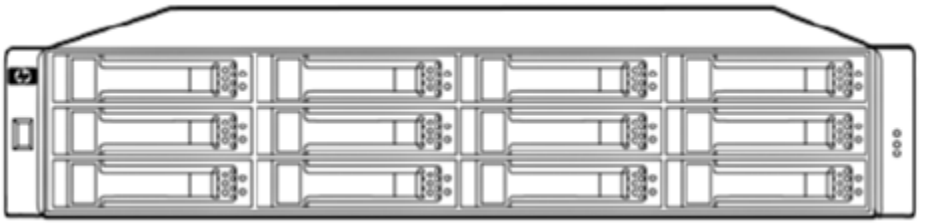
What's New on the Fibre Channel G3

- Two new 8Gb controllers: a single-protocol model with two 8Gb FC host ports and a dual-protocol Combo model with two 8Gb FC host ports and two1GbE iSCSI ports each
- 6Gb SAS "backend" supporting the P2000 LFF and the D2700 SFF 6Gb disk enclosures
- Added scalability to 96 LFF drives or 149 SFF drives
- 64 Snapshots come standard on all G3 models. Maximum 512 Snapshots with optional software license.
- Optional controller-based Remote Snap allows remote replication between two P2000 G3 models over iSCSI (with the Combo Controller) or over Fibre Channel.
- Embedded SMI-S and drive spin-down capability

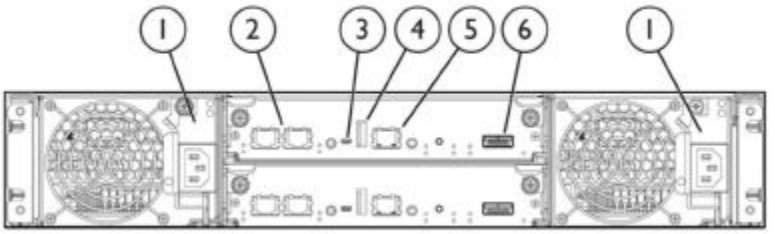
Overview



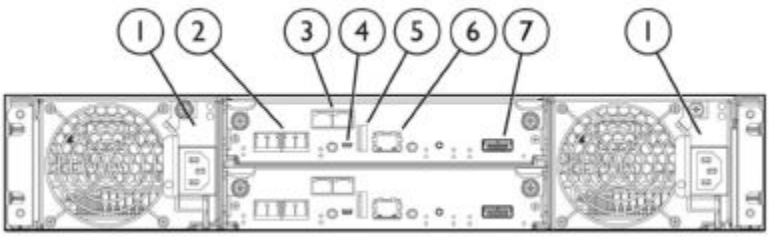
HP StorageWorks P2000 G3 FC SFF Modular Smart Array



HP StorageWorks P2000 G3 FC LFF Modular Smart Array



1. Power supplies
2. Fibre Channel ports
3. CLI port (mini-USB)
4. Reserved for future use
5. Management Ethernet port
6. Expansion port



1. Power supplies
2. Fibre Channel ports
3. iSCSI ports
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Overview

Models

StorageWorks P2000 G3 FC Modular Smart Array	**P2000 G3 FC Controllers & Controller-less Chassis**	
	HP StorageWorks P2000 G3 FC Modular Smart Array Controller (two 8Gb FC ports)	AP836A
	HP StorageWorks P2000 G3 FC/iSCSI Combo Modular Smart Array Controller (two 8Gb FC ports and two 1GbE iSCSI ports)	AP837A
	HP StorageWorks P2000 Modular Smart Array 3.5-in Drive Bay Chassis (LFF) (Will accept one or two controllers or Disk Enclosure I/O modules)	AP838A
	HP StorageWorks P2000 Modular Smart Array 2.5-in Drive Bay Chassis (SFF) (Will accept one or two controllers, not I/O modules)	AP839A
	Disk Enclosures	
	HP StorageWorks P2000 Dual I/O LFF Drive Enclosure, twelve 3.5" drive bays (w/ two.5m mini-SAS to mini-SAS cables. Used with single or dual controller LFF or SFF array head)	AP843A
	HP StorageWorks P2000 LFF Drive Enclosure I/O Module (no cable included. Designed for use with blank LFF chassis AP838A)	AJ844A
	HP StorageWorks D2700 SFF Disk Enclosure, twenty-five 2.5" drive bays (w/ two .5m mini-SAS to mini-SAS cables. Used with single or dual controller LFF or SFF array head)	AJ941A
	Configured Units	
	HP StorageWorks P2000 G3 MSA FC Dual Controller LFF Modular Smart Array System	AP845A
	HP StorageWorks P2000 G3 MSA FC Dual Controller SFF Modular Smart Array System	AP846A
	HP StorageWorks P2000 G3 MSA FC/iSCSI Dual Combo Controller LFF Array	AW567A
	HP StorageWorks P2000 G3 MSA FC/iSCSI Dual Combo Controller SFF Array	AW568A
	Controller-less Chassis: DC-powered units	
	HP StorageWorks P2000 DC-power LFF Chassis (can add one or two P2000 G3 FC controllers or P2000 JBOD I/O modules)	AP840A
	HP StorageWorks P2000 DC-power SFF Chassis (can add one or two P2000 G3 FC controllers. No P2000 JBOD I/O module support)	AP841A
	Related Option: MSA2000fc G2 controller (Previous generation)	
	HP StorageWorks 2300fc G2 Modular Smart Array Controller (limited use) (for use only by those needing to configure an older MSA2000fc G2 array. Only supports G2 features, functionalities. Maximum 99 SFF or 60 LFF drives, 256 snaps, no Remote Snap)	AJ798A

Features and Benefits

Key Hardware Features

- Highly efficient consolidation and sharing of storage geared to departmental and small to medium business requirements
- Cost efficient plus high-availability choices
- Choice of controllers: two port 8Gb Fibre Channel or a Combo controller with two 8Gb FC ports and two 1GbE iSCSI ports
- Flexibility in drives: LFF P2000 LFF 3.5-inch or HP ProLiant SFF 2.5-inch drives
- Enterprise-class SAS, SAS Midline, and archival-class SATA Midline drives as the need and budget dictates
- Dual-ported SAS drives for enterprise needs
- Large capacity SATA drives for inexpensive archival storage
- Able to mix SAS and SATA drives within the same drive enclosure
- Supports mixing LFF and SFF JBODs behind the same array. Limited by 8 enclosures total (max: 7 LFF or 5 SFF, 96 LFF drives, 149 SFF drives. No combination producing more than149 drive maximum.
- Choose either single or dual controller array models to fit the budget

Customer Benefits

- The HP StorageWorks 2000 Modular Smart Array family (P2000 G3, MSA2000 G2) manages growing storage requirements across multiple HP ProLiant and Integrity servers for customers who need a centralized dedicated storage solution for applications (check model for specific server support). SANs allow for controlled, cost-effective growth and increased protection of data.
- Its ease of management allows a department or small company to effectively handle growing storage requirements with a minimum of complexity.
- The HP StorageWorks P2000 G3 FC/iSCSI Combo Modular Smart Array Controller offers both FC and iSCSI functionalities built into a single array controller thus allowing customers to get both performance storage thru FC and extend their SAN investment with low-cost iSCSI. It also offers remote replication feature for data protection.
- Depending on the model chosen, the modular design allows the user to start relatively small but supports future growth to hundreds of users and up to 57.6 TB SAS or 192 TB SATA (LFF drives) with the addition of the maximum number of P2000 LFF drive enclosures (7). Choosing SFF drives, the array can grow up to 44.7 TB SAS or 74.5 TB of SAS MDL or SATA MDL with the maximum number of D2700 SFF enclosures (5).
- The P2000 G3 FC array comes standard with 64 controller-based snapshots and clone capability, allowing the smaller departmental user or company to implement functionality once only available to much larger firms with expensive arrays. The P2000 G3 FC also supports an optional 512 snaps.
- Also available is the optional controller-based Remote Snap capability (available only with the new P2000 G3 models), allowing the entry-level array user the ability to replicate their data to another P2000 G3 array, be it across campus or across the net. This can be accomplished over FC or iSCSI.
- Unequalled flexibility: upgradable by design. Owners of the original MSA2000 array or the second generation MSA2000 G2 series are able to do data-in-place controller upgrades to the P2000 G3 FC. Cross protocol upgrades are also supported between the FC, the SAS, and the iSCSI controllers. This unique ability protects the earlier investments in chassis, drives, and JBODs. Refer to

Features and Benefits

HP P2000 G3 FC Models At a Glance:

- High performance Modular Smart Array controllers, either with two 8Gb Fibre Channel ports or the Combo controller with 8Gb Fibre Channel and 1GbE iSCSI ports
- Single or dual controller capability to fit initial budget constraints
- 2 GB transportable read/write cache per controller - battery-free cache backup with super capacitors and compact flash
- 512 LUNs with LUN size up to 16TB
- 2U rack mount chassis combining both the controller and disk shelf
- Twelve 3.5-inch or twenty-four 2.5-inch dual-ported SAS or SATA drive bays (supports mixing of drive types in a single shelf)
- Supports expansion to seven additional LFF enclosures for a total of 96 LFF disks
- Supports expansion to five additional SFF enclosures (D2700) for a maximum total of 149 SFF disks
- Redundant power supplies and fans are standard
- RAID levels 0, 1, 3, 5, 6, 10, 50
- Non-disruptive on-line controller code upgrade (requires dual controllers w/ multi-pathing software)
- FC ports have heterogeneous support for 32-bit and 64-bit Windows, Red Hat and SuSE Linux, and HP-UX.
- OpenVMS on Integrity
- Windows Server 2008 x64 Hyper-V, VMware, and Red Hat Enterprise Linux Virtualization
- Qualified and certified for Windows, Linux, and HP-UX (and OpenVMS) clustering
- Controller-based 64 snapshot, and clone capability standard. 512 Snap and Remote Snap functionality optional.

Family Information

	P2000 G3 FC	MSA2000i G2	MSA2000sa G2	Comparison w/ EVA4400
Capacity Minimum / with maximum additional drive enclosures	**LFF**: 7.2 TB SAS or 24 TB SATA w/ 7 LFF enclosures: 57.6 TB SAS or 192 TB SATA **SFF**: 7.2 TB SAS or 12 TB SATA w/ 5 D2700 JBODs: 44.7 TB SAS or 74.5 TB SATA	**LFF**: 5.4 TB SAS or 12 TB SATA w/ 4 drive enclosures: 21.6 TB SAS or 48 TB SATA **SFF**: 7.2 TB SAS or 6 TB SATA w/ 3 MSA70 JBODs: 29.7 TB SAS or 24.7 TB SATA	**LFF**: 5.4 TB SAS or 12 TB SATA w/ 4 drive enclosures 21.6 TB SAS or 48 TB SATA **SFF**: 7.2 TB SAS or 6 TB SATA w/ 3 MSA70 JBODs: 29.7 TB SAS or 24.7 TB SATA	**LFF**: 5.4 TB FC or 12 TB FATA w/ 8 drive enclosures 43 TB FC or 96 TB FATA (LFF only)
Controller Cache	2 GB per controller	1 GB per controller	1 GB per controller	2 GB per controller
Total LUNs (w/ dual controller)	512	511	512	1024
Host connect P2000 & MSA2000 have 1 or 2 controllers, EVA has 2 controllers standard	Two 8Gb Fibre Channel ports or Two 8Gb FC and two 1GbE iSCSI ports per controller	Two 1 GbE iSCSI ports per controller	Four 3 Gb SAS ports per controller	Two 4 Gb Fibre Channel ports per controller (Ten w/switch)
Maximum Drives w/ expansion	96 LFF/149 SFF	60 LFF/99 SFF	60 LFF/99 SFF	96
Maximum host supported	64	32	64**	512
Optional software: Snapshot, clone, Remote Snap	Snapshot, 64 standard (max 512) Clone (standard) Remote Snap	Snapshot (max 255) clone	Snapshot (max 255) clone	Snapshot, clone, remote data replication
Use for Storage	Primary Storage with SAS. Secondary with SATA	Primary Storage with SAS. Secondary with SATA	Primary Storage with SAS. Secondary with SATA	Primary Storage with FC Secondary with FATA

NOTE: maximum available storage capacity depends on the RAID level being implemented, and is based on maximum number of LUNs and LUN size.
** Supports up to 8 hosts with SAS direct connect and 64 hosts (BladeSystem servers) using 3Gb SAS BL switch

Product Technology

8Gb Fibre Channel technology
Two host ports per controller, shipped with SFPs. the P2000 G3 FC controller can run in either point-to-point or FCAL (loop). The default is FCAL which is used in Direct Connect, particularly with two controllers. The PtP (fabric) mode is used with almost all switches.

Combo controller with FC and iSCSI ports
Product Features
This ingenious dual-protocol "combo" controller supports a full FC SAN through the 8Gb FC ports, while designating the two 1GbE iSCSI ports to enable remote replication over iSCSI protocol or perform as an iSCSI target. This allows economical sharing of the storage resource (the P2000 G3 array) with one department needing the performance afforded by the 8Gb FC ports while simultaneously supporting another department with lesser performance needs and a budget only allowing an iSCSI network.

Modular Chassis
2U rack height. 12 Large Form Factor or 24 Small Form Factor drive bays, accommodating SAS and SATA. Comes with space for one or two controllers, or P2000 3.5-inch disk Enclosure I/O modules (LFF chassis only)

Drives available
The new P2000 G3 FC controller supports both the P2000 3.5-inch Large Form Factor (LFF) drives, and the HP ProLiant 2.5-inch Small Form

Factor (SFF) drives.

- Serial Attached SCSI (SAS) enterprise-class drives are designed for high demand, 24x7 usage.
- SAS Midline and SATA Midline are usually reserved for archival of data as they are both relatively inexpensive and are available in very large capacities.

The HP entry-level family of arrays can accommodate both SAS and SATA drives within the same enclosure making it ideal to have both business-critical, high activity files on SAS drives while using Snapshot, clone, or Remote Snap capability to keep back-up or archival data on the less expensive drives.

For investment protection, the controllers will support single port SAS & SATA drives in a legacy single-domain MSA70. This support allows current owners of MSA70s to migrate their single port drives (in their MSA70 only, not into the array head) to be attached to a P2000 G3 FC or an MSA2000fc G2. They can only cascade to another single I/O MSA70. This is not a data-in-place transition, and overall performance could be impacted.

SAS drive performance can be approximately 30% greater than SATA performance on sequential host I/O. SAS performance excels in sequential lower latency response time and random I/O per second transaction performance due to higher rpm disk speeds yielding lower seek times. SAS drive random performance is generally twice that of SATA drives.

NOTE: P2000 and MSA2 3.5-inch Large Form Factor (LFF) drives are for use only in the P2000 G3 or MSA2000 models. The 2.5-inch Small Form Factor (SFF) drives are supported only with the P2000 G3 or the MSA2300fc G2 controller and are common with and are the same part numbers as the ProLiant hot-plug 2.5-inch drives.

Optional Disk enclosures

Just as the user has a choice of chassis for the array head (LFF and SFF drive bays, AC or DC powered), so also do they have a choice of expansion disk enclosures accommodating either drive size. (**NOTE:** these are not supported as part of a NEBS-certified with the MSA Carrier Grade Chassis.)

P2000 3.5-inch drive enclosure. This 2U unit has twelve LFF (3.5-inch) drive bays and accepts for P2000 dual-ported SAS and SATA drives. The pre-configured HP StorageWorks P2000 Dual I/O LFF Drive Enclosure (AP843A) has two I/O modules and supports both single and dual controller arrays. If a single I/O disk enclosure model is desired, the appropriate chassis should be purchased along with a single I/O module (AP844A).

- This 3.5-inch drive enclosure can be attached to either the P2000 G3 FC LFF or SFF array head.
- Each configured model ships standard with two .5m mini-SAS to mini-SAS cables for cascading to other P2000 drive enclosures
- Up to seven P2000 3.5-inch enclosures can be attached to a P2000 G3 FC or FC/iSCSI Combo controller in the array head.

D2700 2.5-inch drive enclosure. This 2U storage enclosure (AJ941A) is designed to support twenty five ProLiant 2.5-inch Universal form factor (SFF) 6Gb SAS or SATA hard drives. It ships standard with dual I/O modules installed.

- This 2.5-inch drive enclosure can be attached to a P2000 G3 controller (SFF or LFF) array head
- The D2700 enclosure ships with a two .5m miniSAS to miniSAS cable.
- Up to five D2700 may be attached to the P2000 G3 array head, given total support for 149 SFF drives.

Scalability

The P2000 G3 FC controller is designed to allow an installation to begin with smaller capacity and be able to grow gradually as needed. The flexibility of SAS or SATA drive technology, form factors, sizes, speeds, and costs per GB allows a system to easily fit in almost any budget.

- Large Form Factor configurations can scale up to 7.2 TB SAS or 24 TB SATA, expandable to 57.6 TB SAS or 192 TB SATA with the addition of a maximum of seven P2000 3.5-inch Drive Enclosures.
- Small Form Factor configurations can scale from 7.2 TB SAS or 12 TB SATA. With the addition of five D2700 JBODs, the P2000 G3 FC can support 44.7 TB SAS or 74.5 TB SATA.
- Users may configure a 24-drive P2000 G3 FC SFF array head with 12-drive LFF P20000 3.5-inch disk enclosures. This is an excellent method for a configuration that support fast SFF enterprise-class SAS drives in the array head, combined with economical LFF drives staged for archival purposes, all in the same array.
- Qualification of larger capacity drives is ongoing.

LUNs

The MSA2000 family of arrays supports 512 LUNs (total volumes in a dual controller system) and LUN sizes up to 16 TB. The array supports expansion and deletion of any LUN.

RAID 0, 1, 3, 5, 6, 10, 50

In addition to the usual RAID levels, the P2000 G3 features several important additional levels. RAID 6 is the highest level of RAID protection. It allocates two sets of parity data across drives and allows simultaneous write operations. It can withstand two simultaneous drive failures without downtime or data loss. RAID 10 is mirroring and striping without parity. It is the most popular of the multiple RAID levels, allowing large arrays with high performance in most cases and superior fault tolerance. RAID 50 combines the block striping and parity of RAID 5 with the straight block striping of RAID 0, yielding higher performance than RAID 5 through the addition of RAID 0, particularly during writes.

Performance

Performance numbers are a guideline as established by tests using RAW I/O in an Operating System Agnostic test lab environment. A total of 144 GB 15K SAS drives were used in a dual controller configuration of 12 vdisks consisting of twelve disks per vdisk, 1.6 TB volumes, and 3 volumes per host. 4 hosts directly attached to the P2000 G3 FC were used in this test configuration (results cannot be expected with a single host). Results were achieved in Sequential Writes with 256K blocks; all random tests were based on 8K block sizes.

NOTE: Number and type of applications, drive type and number of drives, operating system used, and the number of hosts will affect overall performance. This table is provided strictly as a test-lab comparison. The test results shown for the P2000 G3 are preliminary and designed to give a reference point for comparisons. They will be reposted as necessary.

MSA2 G2 Performance	P2000 G3 FC (estimated, not final)	MSA2000sa G2	MSA2000i G2
Protocol (host connect)	8 Gb Fibre Channel	3 Gb SAS	1GbE Ethernet
MSA2000 RAID 10 Performance Results			
Sequential Reads MB/s	1,551	1,050	274
Sequential Writes MB/s	778	532	266
Random Mix IOPs 60/40 read/write	18,192	17,700	13,493
MSA2000 RAID 5 Performance Results			
Sequential Reads MB/s	1,552	1,050	274
Sequential Writes MB/s	914	617	266
Random Mix IOPs 60/40 read/write	11,361	4,926	5,325
MSA2000 RAID 6 Performance Results			
Sequential Reads MB/s	1,551	1,050	274
Sequential Writes MB/s	893	729	266
Random Mix IOPs 60/40 read/write	6,815	3,865	3,851
Refer to P2000 G3/MSA2000 Best Practices White Paper for configuration guidance to obtain the best overall performance. Best Practices Guide available at: www.hp.com/go/P2000			

DC-power chassis

HP is making the two models of controller-less chassis available with direct current (DC) power supplies. They each have the two empty bays where users can insert one or two P2000 G3 FC controller(s). In addition, the P2000 chassis with LFF drive bay can have P2000 3.5-inch I/O modules inserted to create a LFF DC-power JBOD.
The 500 watt power supply is designed to operate over the input range of -40VDC to -75VDC.

HP StorageWorks P2000 DC-power LFF twelve 3.5-in Drive Bays (supports up to 2 controllers or I/O modules)	AP840A
HP StorageWorks P2000 DC-power SFF twenty-four 2.5-in Drive Bays (supports up to 2 controllers, not I/O modules)	AP841A

Configuration and Management Tools

HP StorageWorks Storage Management Utility (SMU). Management access, out-of-band: WEB GUI, CLI. Interface Types: USB, 10/100 Ethernet. Protocols Supported SNMP, SMI-S, SSL, SSH, SMTP, FTP, HTTP, Telnet

P2000 Software and Documents Support CD

- All product documentation (CD can be used on ALL supported server Operating Systems.)
- MSA Device Discovery Tool (Win and Linux) - reports P2000/MSA HW devices, and supported storage software
- Host Software Bundles (Win and Linux for both ProLiant x86, ProLiant x64 and Integrity IA64servers)
- CD updated quarterly on HP.com with sustaining firmware updates

Hot Plug Expansion and Replacement Support

All P2000 G3 models support hot plug expansion and replacement of redundant controllers, enclosures, fans, power supplies, and I/O modules for simple, fast installation and maintenance.

Family Information

Snapshot and Clone Arrays come standard with 64 snaps, 512 snaps available. Controller based functionality. Offers higher levels of data protection, enabling an almost instant recovery from data failure or corruption. Offers alternative development testing of 'offline' production data and the ability to backup snapped/cloned data.

Overview	The P2000 G3 FC comes integrated with web browser based software for storage and RAID management, setup, configuration, and troubleshooting. This reduces the cost of ownership by reducing the training and technical expertise necessary to install and maintain your HP storage solution. The SPOCK database provides interoperability information for thousands of components and millions of component combinations. It is available to all users on the HP.com website. http://www.hp.com/storage/spock
Server Compatibility	Supports most HP ProLiant, BladeSystems and Integrity servers including • HP ProLiant DL, ML • HP c-Class Blade Servers • Integrity servers, IA64
Industry Standard X86 servers support	• Supports most multi-vendor industry standard 32-bit Intel and AMD based (x86) servers. HP requires the Third-Party Server to be logo'd and listed on the Microsoft Windows Server Catalog. • Refer to the Microsoft website: http://www.microsoft.com/windows/catalog/server/ • HP StorageWorks Division recommends that the Third-Party Server Vendor is an active member of TSANet. Refer to the TSANet website for details: www.tsanet.com • Non-HP servers will generally be supported if the HP storage stack is used. This includes supported HP branded HBAs and drivers, and supported FC switches.
OS Support (x86)	Refer to the HP support statements for complete current OS version support: http://www.hp.com/storage/spock • Microsoft Windows Server 2008 IA32, x64, IA64 (Standard, Enterprise, Datacenter) • Microsoft Windows 2003 and 2003 R2 IA32, x64, IA64 • Red Hat Linux (32/64) • SuSE SLES (32/64) • Microsoft Windows Server 2008 x64 Hyper-V • VMware • Citrix XenServer HP Enterprise Edition • Red Hat Virtualization
OS Support (Integrity)	• HP-UX • Windows • Linux • OpenVMS
Web Browser support	• The P2000 G3 and the older MSA2000 support target based management, and include a Web interface and a telnet interface, and require a web browser for management. • The P2000 G3 FC requires Microsoft Internet Explorer V7.x and V8.x • The MSA2000 and the MSA2000 G2 require Microsoft Internet Explorer V6.X and V7.X (strongly encouraged) • Mozilla Firefox 1.0.7 or later is supported

Snapshot and Volume Copy Software for the P2000 G3 FC

Product Features

Data Protection

- Snapshots create up to 512 point-in-time pictures of data (512 snaps are exclusive to the P2000 G3)
- Volume Copies create up to 128 point-in-time copies of data
- Recovery is instant - revert data from any previous Snapshot or Volume Copy
- Backup 'snapped' data to disk, virtual tape, or physical tape without a backup window
- A 64 snapshot license and Volume Copy are included with all P2000 G3 FC models.
  - If support and updates are desired for bundled software functionalities (such as 64 LTU Snap and/or Volume Copy etc in the P2000 G3 products) a combination HW + SW support care pack must be purchased.
  - HP does not provide warranty assistance for software products included with our base hardware products. This would either be SupportPlus or SupportPlus24. The hardware warranty component of these services is accounted for in the pricing of the SP and SP24 care packs.

Data Testing

- Snap or clone data to test the performance of a software application on 'offline' production data
- Snap or clone data to test how a software patch or enhancement will function on 'offline; production dat0061

P2000 G3 FC Snapshot and Clone:

G3 controllers/models come STANDARD with 64 snapshots and Volume Copy software
512 Snapshot option is ONLY available and supported with the G3, not older generation MSA2000 models

HP P2000 Snapshot 512 Software LTU	TA806A
HP P2000 Snapshot 512 Software E-LTU	TA806AAE

MSA2000 and MSA2000 G2 Snapshot and Clone software:

Snapshot and Volume Copy software is optional on models other than the P2000 G3 FC. The following skus are designated for use by the older models of MSA. They are neither necessary nor available for the P2000 G3 FC.

HP StorageWorks 2000 Modular Smart Array Snapshot 255 Software LTU[1]	T5539A
HP StorageWorks 2000 Modular Smart Array Snapshot 64 Software LTU	T5512A
HP StorageWorks 2000 Modular Smart Array Snapshot 8 Software LTU	T5513A
HP StorageWorks 2000 Modular Smart Array Snapshot 8/255 Upgrade Software LTU[1]	T5540A
HP StorageWorks 2000 Modular Smart Array Snapshot 64/255 Upgrade Software LTU[1]	T5541A
HP StorageWorks 2000 Modular Smart Array Snapshot 8 to 64 Upgrade Software LTU	T5515A
HP StorageWorks 2000 Modular Smart Array Volume Copy Software LTU	T5514A

[1] The snapshot software is supported on G2 and G3 models only. 512 snaps only applies to G3 controllers.

HP StorageWorks P2000 Remote Snap Software

- HP StorageWorks P2000 Remote Snap Software is an array based software that provides remote replication on the HP StorageWorks P2000 G3 MSA Array product family. HP Remote Snap is a form of asynchronous replication which consists of replication of block-level data from a volume on a local system to a volume that may be on the same system or on a second independent system. This second system may be collocated with the first system or may be located at a remote site.

Optional Software

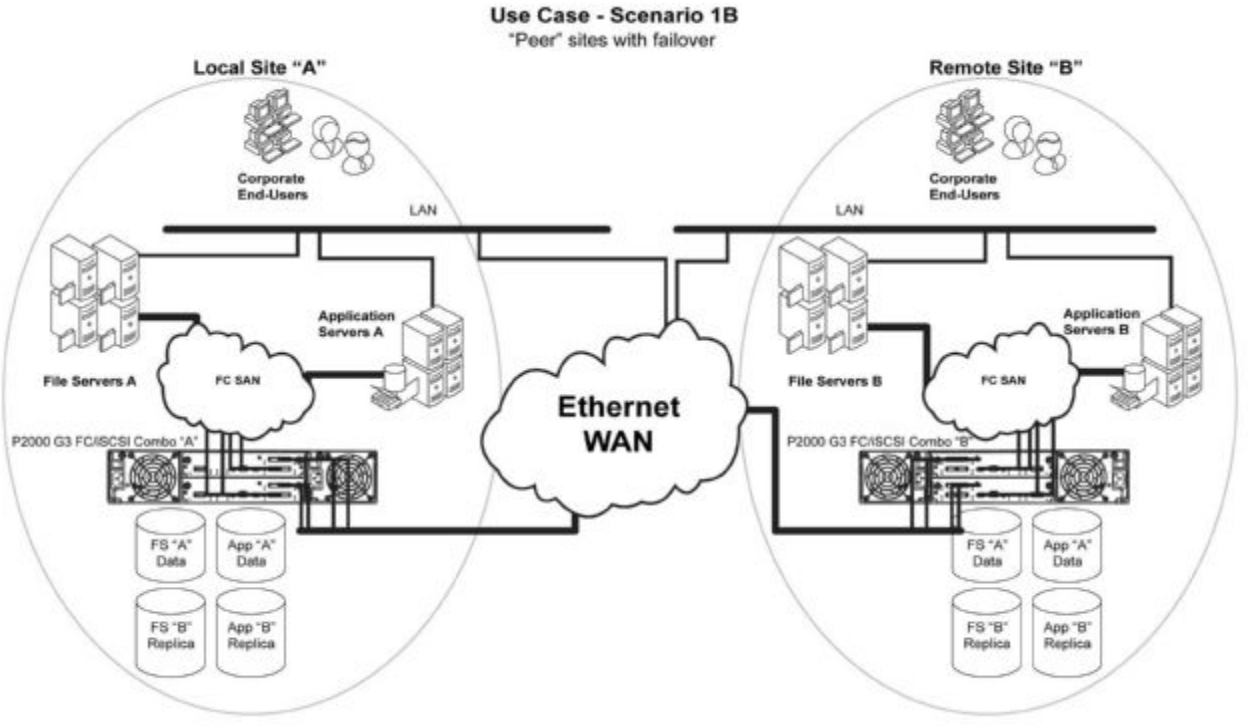
- HP Remote Snap functionality is based on existing Snapshot technology offered by HP MSA2000 SAN Array products. Snapshots are used to track the data to be replicated as well as to determine the differences in data updated on the master volume, minimizing the amount of data to be transferred.
- HP Remote Snap replication technology provides the ability to accomplish key data management and protection capabilities. First, because Remote Snap uses snapshots as the underlying technology it creates multiple local recovery points which can be used for such tasks as to complement daily backups; second, replication provides the ability to access data in a remote site which could be used for dispersed operations; and third but definitely not least important replication allows for business continuance in the event of a failure on the primary site.
- In order to perform a replication, a snapshot of the volume to be replicated is taken, creating a point-in-time image of the data. This point-in-time image is then replicated to the destination volume by copying the data represented by the snapshot via a transport medium such as TCP/IP (iSCSI) or Fibre Channel. The amount of data transferred is minimized though the use of snapshots whenever possible.

HP StorageWorks P2000 Array System Remote Snap Software LTU	TA808A
HP StorageWorks P2000 Array System Remote Snap Software E-LTU	TA808AAE

Product Features

- Storage based asynchronous snapshot replication
- Initial copy of data can be performed locally, reducing burden on wide area networks
- Support of both Ethernet and Fiber Channel interconnects provides flexible options to the application environments.
- Snapshot based replication technology means only changed data will be replicated to alternate site
- Advanced scheduler provides several options to IT administrators for business continuance
- Flexible architecture allows remote replication between P2000 G3 arrays. Protects existing investments and enhances business continuity planning objectives by allowing replication among the full P2000 G3 family.
- Replication Wizard simplifies the task of setting up and establishing replication pairs from one unified, easy to use GUI.
- Snapshot based replication enables both local and remote recovery depending on the need. Snapshot replication isolates problems to a specific point in time which can be selected by the administrator. Additionally snapshot replication supports longer distance replication.
- Multiple relationships provide greater storage flexibility and utilization.
- Bundled 64 Snapshots and Volume Copy integration provides better efficiencies by combining the management and array technologies to create local copies.
- Fast application recovery with minimal or no transaction loss
- Creation of disaster tolerant copies of your critical business data
- No-single-point-of-failure solution to increase the availability of your customers data

Optional Software



Customer Benefits

Disaster Recovery

Replication technology has typically been used to address disaster recovery issues. Disaster recovery is still the driving business case behind replication. Remote replication can be implemented from the production site to one or more remote sites across a campus, across town, across a state or across the country. When a disaster strikes the primary location, the applications can be brought up at the remote site and continue processing against the replicated copies. When the primary site is back online, the replication can be reversed and when the data is resynchronized, processing can be switched back to the primary site and business can continue. In the past, if an e-mail system experienced a disaster it was an "oh well" moment. The loss of a day or more of e-mail was not considered important. Today, e-mail is a critical component of many companies' business plans and recovering e-mail after a disaster quickly and completely is required.

Maintenance

HP Remote Snap software can also be used to solve other business needs. For instance, E-mail servers may need periodic maintenance that can take hours to complete. With remote replication in place, the downtime can be minimal (as long as it takes to bring the remote peer of the primary e-mail server online). The primary server can be worked on (patches, hardware upgrades, etc.) and then brought back online and into production. A whole datacenter can be failed over to a remote site on purpose to perform maintenance on generators, air conditioning, etc. Replication can also be used to perform a datacenter move with minimal downtime (fail everything to the DR site, move the production datacenter to its new location then fail the DR site back to the new datacenter).

Storage Based

Data replication is performed at the storage subsystem controller level and is totally transparent to the host, alleviating unnecessary host cycles to perform the data mirroring functions. Unlike a fabric based or host based solution, the storage based solution dedicates its resources to managing the replication process between arrays, with minimal impact to applications, other data or devices on the SAN.

Bi-Directional

The bidirectional HP P2000 Array solution addresses the growing need among businesses to ensure continuous availability of applications that are critical to daily business operations. HP StorageWorks P2000 enables two sites in a remote replication connection to use each other as a destination to maintain replicated copies of online data. This maximizes resource utilization while enabling business continuance, even in the event of disaster.

Disaster Tolerance

The P2000 G3 family utilized snapshot data online and in real time to a remote P2000 G3 through a local or extended storage area network (SAN). Additionally, data replication can be bidirectional, meaning that a storage array can be both a source and a destination. A particular LUN can be replicated in only one direction between the two storage arrays. Write I/O data sent to the source is replicated by HP P2000 Array to the destination. A properly configured, HP P2000 G3 array is a replication solution that guarantees data integrity in the event of a storage system or site failure.

Normalization (first initial copy)

When a DR site is initially created a normalization or initial copy of the data from the source volume to the target volume must occur. The P2000 G3 array allows this first copy to take place locally. After completion the disks can me manually moved to the remote location. Subsequent changes will only remotely copy the changed blocks.

SAN Extensions

HP P2000 G3 Array provides the capability to replicate data over direct Fibre Channel. The distances supported over dark fiber are determined by the speed of the dark fiber connection and the technology used to communicate over the dark fiber.

HP StorageWorks Storage Mirroring

Natural and man-made disasters can occur when you least expect it - serving as a reminder that in less than a moment's notice, volumes of data loss can occur. To prevent data loss from failure, error, or disaster, HP StorageWorks Storage Mirroring Software provides replication and recovery of valuable Windows and Linux data to another server. Proactive replication is a key strategy coupled with tape backup and snapshot technology for up-to-the-second data protection. Having replicated data co-located enables customers to recover their static and transactional data in seconds to minutes.

Patented replication and failover technology continuously captures byte-level data changes as they occur in your production environment and replicates those changes to one or more servers in any location without geographic limitations. By replicating only the bytes that change, Storage Mirroring Software uses the absolute minimum bandwidth required to replicate customer data. The software does not require special hardware to run and utilizes existing LAN or WAN infrastructure -saving time, additional investment, and maintenance. Storage Mirroring software is storage independent and will support any DAS, NAS, and SAN storage device. Additional flexibility is achieved with Windows and Linux operating system support. Storage Mirroring works on Windows Server 2003, Windows Server 2008, Windows Storage Server, 64-bit Windows, Windows on Itanium and Red Hat Linux. The platform flexibility, resource optimization, and application-specific protection enable customers to solidify their data and disaster protection strategies.

For more information visit:
http://h18006.www1.hp.com/products/storage/software/sm/index.html

Storage Mirroring will now be offered in 3 different product SKU families

- Stock LTU (channel stocked license(s))
- E-LTU (electronic delivery - order any number of licenses - 10 or higher)
- LTU (paper delivery which replaces all previous 10 pack licenses -an alternative to electronic delivery)

Stock LTU Base Models

Order the Stock LTU from an HP authorized reseller. Delivery will consist of a paper entitlement certificate per SKU and a single activation code. Add a corresponding Storage Mirroring Care Pack for support.

HP StorageWorks Storage Mirroring Windows Media Kit	TA778A
HP StorageWorks Storage Mirroring Data Migration LTU	TA779A
HP StorageWorks Storage Mirroring Replicate Edition LTU	TA781A
HP StorageWorks Storage Mirroring Replicate Target Edition LTU	TA783A
HP StorageWorks Storage Mirroring Replicate Target Exchange LTU	TA785A
HP StorageWorks Storage Mirroring Recover Entry Edition LTU	TA787A
HP StorageWorks Storage Mirroring Recover Standard Edition LTU	TA789A
HP StorageWorks Storage Mirroring Recover Enterprise Edition LTU	TA791A
HP StorageWorks Storage Mirroring Recover Premium Edition LTU	TA793A
HP StorageWorks Storage Mirroring Recover Virtual Host 1 LTU	TA795A
HP StorageWorks Storage Mirroring Recover Virtual Host 10 LTU	TA797A
HP StorageWorks Storage Mirroring Recover Virtual Host Unlimited LTU	TA799A

E-LTU Base Models

Order E-LTU when you require 10 or more licenses and you desire electronic delivery of those 10+ licenses. E-LTUs replace the previous 10 packs. Previously, an odd number of licenses over 10 require 10 packs and multiple singles, now E-LTUs will deliver the exact number of licenses electronically. Add corresponding Storage Mirroring Care Packs for support.

NOTE: Electronic software is now available in most countries. HP recommends purchasing electronic products over physical products when available for faster delivery and the convenience of not having to manage-either file away or throw away-confidential paper licenses. For more information, please contact an HP representative.

HP StorageWorks Storage Mirroring Data Migration E-LTU **NOTE:** Electronic software is available in all countries except China and Japan. China and Japan customers should order the physical equivalent.	TA779AAE
HP StorageWorks Storage Mirroring Replicate Edition E-LTU **NOTE:** Electronic software is available in all countries except China and Japan. China and Japan customers should order the physical equivalent.	TA781AAE
HP StorageWorks Storage Mirroring Replicate Target Edition E-LTU **NOTE:** Electronic software is available in all countries except China and Japan. China and Japan customers should order the physical equivalent.	TA783AAE
HP StorageWorks Storage Mirroring Replicate Target Exchange E-LTU **NOTE:** Electronic software is available in all countries except China and Japan. China and Japan customers should order the physical equivalent.	TA785AAE
HP StorageWorks Storage Mirroring Recover Entry Edition E-LTU **NOTE:** Electronic software is available in all countries except China and Japan. China and Japan customers should order the physical equivalent.	TA787AAE
HP StorageWorks Storage Mirroring Recover Standard Edition E-LTU **NOTE:** Electronic software is available in all countries except China and Japan. China and Japan customers should order the physical equivalent.	TA789AAE
HP StorageWorks Storage Mirroring Recover Enterprise Edition E-LTU **NOTE:** Electronic software is available in all countries except China and Japan. China and Japan customers should order the physical equivalent.	TA791AAE
HP StorageWorks Storage Mirroring Recover Premium Edition E-LTU **NOTE:** Electronic software is available in all countries except China and Japan. China and Japan customers should order the physical equivalent.	TA793AAE

LTU Base Models

Optional Software

Order LTUs when you require 10 or more licenses and you desire paper delivery of those 10+ licenses. LTUs replace the previous 10 packs. Previously, an odd number of licenses over 10 require 10 packs and multiple singles, now LTUs will deliver the exact number of licenses via regular mail Add corresponding Storage Mirroring Care Packs for support.

HP StorageWorks Storage Mirroring Data Migration Stock LTU	TA780A
HP StorageWorks Storage Mirroring Replicate Edition Stock LTU	TA782A
HP StorageWorks Storage Mirroring Replicate Target Edition Stock LTU	TA784A
HP StorageWorks Storage Mirroring Replicate Target Exchange Stock LTU	TA786A
HP StorageWorks Storage Mirroring Recover Entry Edition Stock LTU	TA788A
HP StorageWorks Storage Mirroring Recover Standard Edition Stock LTU	TA790A
HP StorageWorks Storage Mirroring Recover Enterprise Edition Stock LTU	TA792A
HP StorageWorks Storage Mirroring Recover Premium Edition Stock LTU	TA794A
HP StorageWorks Storage Mirroring Recover Virtual Host 1 Stock LTU	TA796A
HP StorageWorks Storage Mirroring Recover Virtual Host 10 Stock LTU	TA798A
HP StorageWorks Storage Mirroring Recover Virtual Host Unlimited Stock LTU	TA800A

NOTE: For more information visit:
http://h18006.www1.hp.com/products/storage/software/sm/index.html

Path failover (MPIO)

MPIO Basic Failover for Windows provides a single multi-path solution for HP StorageWorks MSA2000fc Modular Smart Array on HP ProLiant servers by providing basic path failover. Supports Windows 2003, Windows 2003 R2, and Windows 2003 X64 operating systems.

- HP MPIO Full Featured DSM for MSA2000fc v2.6.0.5
- Microsoft Windows 2008: Microsoft MPIO is bundled with Windows Server 2008 and must be installed as an operating system feature.
- Failover support for Linux is with Device Mapper 4.0 or higher. HP-UX PV-Links
- HP-UX: native multipathing for HP-UX v3; PV-Links for HP-UX v2

Warranty

Three-year limited warranty, parts exchange Next Business day delivery

Enclosures, Hard drives, and Options for the P2000 G3 FC carry their own warranty. Refer to HP's Limited Warranty Statement for more information.

The P2000 G3 FC has been designed with customer self repairable parts to minimize repair time and provide greater flexibility in performing defective parts replacement. Please refer to HP's limited warranty Statement and parts replacement instructions for further details.

http://h18006.www1.hp.com/products/storageworks/warranty.html

Products included in various kits carry their own individual warranties.

NOTE: The warranty of the hard drive options purchased with the P2000 G3 FC product is different for SAS hard drives versus SATA hard drives. SAS hard drive options have a three year warranty and SATA hard drives options have a one year warranty.

HP Care Pack Services. Scalable, Flexible, Dependable. Like your storage.

Your storage is evolving. Get scalable support that evolves with it. HP Care Pack Services is an easy-to-buy, easy-to-use portfolio of packaged services covering your lifecycle needs. You can rely on our highly skilled, HP certified professionals to offer a breadth of expertise across leading storage technologies, and work side by side with you for optimal results. Push services beyond expectations and choose support that meets the changing needs of your business with the same reliability, scalability and flexibility you demand of your storage.

Protect your business beyond the warranty

Standard warranty protects against product defects and some causes of downtime. HP Care Pack Services helps you proactively guard against unplanned downtime which can reduce your productivity and profitability. By using a standard approach to warranty uplifts, such as HP Care Pack Services, customers can be more sure of consistency of operations for both mission-critical and standard business computing.

Extending warranties with HP Care Pack Services

The key to normalizing the warranty of combined solutions-is making service uplift simple: HP Care Pack Services. This portfolio of predefined packages, extending across the entire IT lifecycle, offering consulting, education, technical support, optimization, risk assessment, and more. It's entirely flexible allowing customers to extend the cover to the precise level of support required. Customer's standard hardware warranty, for example, can be upgraded to next-business-day response, to same-day coverage, or even to a committed six-hour call-to-repair service available 24 hours every day of the week.

- Provide consistent, predictable levels of support across your entire department or business
- Give you direct access to proven technical and problem-solving expertise
- Offer a choice of response-time and repair-time commitments
- Are available whenever and wherever you do business

For many products, post-warranty HP Care Pack Services are available when your original warranty has expired. Choose the support levels that meet your business requirements, from basic to mission-critical. http://www.hp.com/hps/storage

NOTE: Care Pack Services availability may vary by product and country.

Service and Support, HP Care Pack, and Warranty Information

Related Services	**Services that will enhance the user experience in many product deployments**	
	HP SAN Solution Service	Get your SAN implementation right - right from the start. Storage has become essential to the growth and agility of your business. That's why choosing an HP SAN as your data management solution is a smart business decision. But your SAN can deliver the results you need only if it is implemented correctly and integrated with your business. SAN installation, startup, and integration call for specialized expertise in planning and design, hardware configuration, network software installation, and operability verification. Your SAN needs to be configured for high performance and availability. And it needs to be integrated with your applications, management environment, and business processes.
	HP Data Migration Service	Minimize the risks involved in transferring data to your HP StorageWorks SAN. You need to move your critical enterprise data to your new HP StorageWorks SAN platform. And you need to accomplish that without losing data. And without interrupting your ongoing business operations. HP Data Migration Service helps you lessen the risk of data loss, minimize threats to data integrity, and avoid productivity-sapping performance slowdowns during data transport. A highly experienced HP Services storage specialist works with you to rapidly and securely migrate mission-critical business information across your data center or around the globe - regardless of the complexity of your environment.
	HP Backup & Recovery Solution Service - ISV	This service consists of installation of the ISV backup software for the supported SAN environment per HP's and the ISV's quality standards by a trained service specialist. HP Backup and Recovery Solution Service for ISV Backup Software provides for the implementation of the supported ISV backup software in a SAN environment. The two levels of service described here are based on the size and complexity of the backup environment. This service is available for VERITAS NetBackup, VERITAS Backup Exec, CommVault Galaxy, and Legato NetWorker. Implementation of CommVault Galaxy is only available as a Level 3 service.

Service and Support, HP Care Pack, and Warranty Information

eSupport

HP eSupport is a portfolio of technology-based services that assist you with managing your business environment - from the desktop to the data center.

Support Portal
The HP support portal provides one-stop access to the information, tools and services you need to manage the daily operations of your IT environment.

Features include:

- Access to self-solve tools (including search technical knowledge base)
- Efficient logging and tracking of support cases
- Collaboration with other business and IT professionals
- Download of patches and drivers
- Access to diagnostic tools
- Proactive notification of relevant information

Access to certain features of the support portal requires an HP service agreement. To access the support portal, visit: http://www.hp.com/support

Remote Support Technology (RST)-HP Remote Support Pack
Taking a more proactive approach to IT support, the HP Remote Support pack plug-in module easily integrates with HP Systems Insight Manager to provide a powerful, unified "single pane of glass" solution for onsite and remote management.

HP Remote Support Pack enhances HP Systems Insight Manager with intelligent event diagnosis plus the automatic submission of hardware event notifications securely to HP support, including acknowledgment and status returns. It adds remote configuration collections to allow the delivery of assessment and proactive services for your SAN storage and HP-UX environments.

Customer Technical Training

Consider education as an integral part of your strategy to get the best return on investment for your HP storage solution. HP offers a variety of training courses on storage software, networking, archiving and disk storage systems. Our classes are available in many delivery modalities from traditional instructor-led courses at one of our 80 training centers worldwide to on-site training customized to your needs or online. www.hp.com/learn/storage

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HP Services Awards

HP Services continues to be recognized for service and support excellence by customers, partners, industry organizations and publications around the world. Recent honors and award reflect our services team's dedications, technical expertise, professionalism and uncompromising commitment to customer satisfaction. For a list of all our awards, please visit: http://h20129.ww2.hp.com/services/cache/77318-0-0-225-121.html.

Additional Services Information

For more information about HP Care Pack Services for Storage, please visit: http://www.hp.com/hps/storage

If you have specific questions, contact your local HP representative. Contact information for a representative in your area can be found at "Contact HP" http://www.hp.com

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Warranty Upgrade Options

- Response - Upgrade on-site response from next business day to same day 4-hour response or 6 Hour Call To Repair
- Coverage - Extend hours of coverage from next business day to 9 hours x 5 days to 24 hours x 7 days
- Duration Select duration of coverage for a period of 1, 3, 4 or 5 years

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Service and Support, HP Care Pack, and Warranty Information

Software Product Services

Product support provides the customer access to HP's experienced technical support resources, as well as access to HP's Information Services database for support on a variety of multi-vendor/multiplatform software products. Product support includes escalation and problem coordination with the appropriate engineering group. HP Services offer a variety of options to allow you to tailor your product service to meet the needs of your organization. Basic warranty on products can be uplifted from day one to ensure you receive the service you need when you need it.

Hardware Product Services

- Installation services - StorageWorks MSA Family Disk Array Installation and Startup
- On-site Maintenance (includes warranty support)
- Response time upgrades during the warranty period
- Post-warranty coverage

Customer Self Repair

HP products are designed with many Customer Self Repair (CSR) parts to minimize repair time and allow for greater flexibility in performing defective parts replacement. If during the diagnosis period, HP identifies that the repair can be accomplished by the use of a CSR part, HP will ship that part directly to you for replacement. There are two categories of CSR parts:

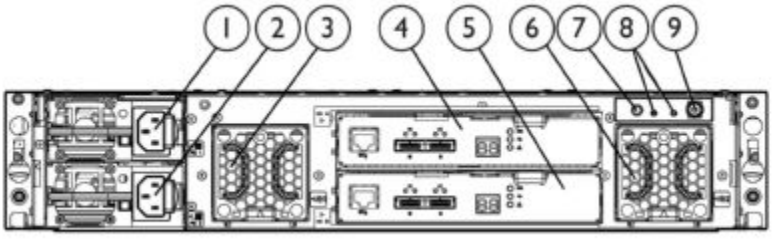
- Parts for which customer self repair is mandatory. If you request HP to replace these parts, you will be charged for the travel and labor costs of this service.
- Parts for which customer self repair is optional. These parts are also designed for customer self repair. If, however, you require that HP replace them for your product.

Warranty

The MSA warranty for CSR parts for this product consists of 1-year parts exchange, next business day.

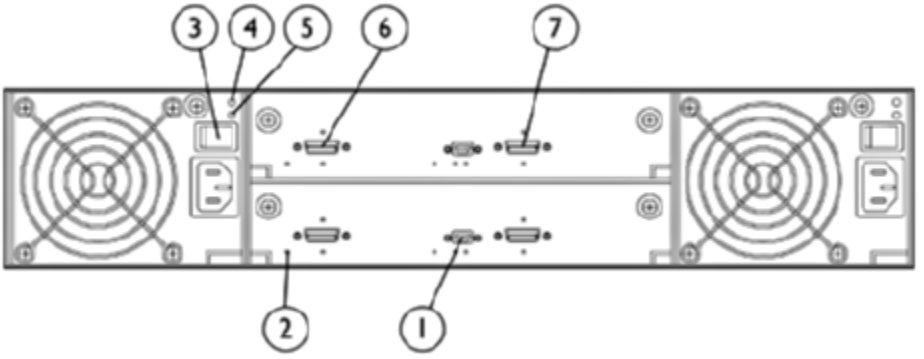
NOTE: The HP MSA warranty includes support for Customer Self Repair (CSR). The HP MSA cartridges, terminators, external cables, drives, magazines, controller board and power supplies are mandatory customer self repair parts. This means both the removal and replacement of the above parts are designed for easy replacement; the on-site warranty does not extend to these parts. However, customers may request HP Services to replace these replaceable units (RUs) for an additional charge. Also, customers who purchase an HP Support Agreement have the option to perform CSR or receive onsite support.

Please refer to HP's Limited Warranty Statement for further details:
http://h18006.www1.hp.com/products/storageworks/warranty.html



HP StorageWorks D2700 Disk Enclosure
Rear Panel components

1. Power Supply 1
2. Power Supply 2
3. Fan 1
4. I/O Module A
5. I/O Module B
6. Fan 2
7. Rear UID push button
8. Enclosure LEDs
9. Power on/standby button



P2000 Dual I/O 3.5-inch 12 Drive Enclosure
Rear Panel components

1. Service Port
2. Unit Locator
3. Power Switch
4. DC Voltage / Fan Fault
5. AC Power Good
6. SAS In Port
7. SAS Out Port

Configure to Order Program Information

HP introduces the Configure to Order program for the P2000 G3 family The P2000 G3 models and options may or may not be factory installed in a rack with add-on controllers, switches, hubs, P2000 disk enclosures and hard drives. The P2000 G3 arrays may be integrated with ProLiant servers or as standalone storage.
Orders to be shipped through the CTO process must have a minimum of two drives ordered per controller. SAN Starter Kits are not eligible for CTO.

Description	Product #
P2000 G3 FC Controllers & Controller-less Chassis	
HP StorageWorks P2000 G3 FC Modular Smart Array Controller (two 8Gb FC ports)	AP836A#0D1
HP StorageWorks P2000 G3 FC/iSCSI Combo Modular Smart Array Controller (two 8Gb FC ports and two 1GbE iSCSI ports)	AP837A#0D1
HP StorageWorks P2000 Modular Smart Array 3.5-in Drive Bay Chassis (LFF) (Will accept one or two controllers or Disk Enclosure I/O modules)	AP838A#0D1
HP StorageWorks P2000 Modular Smart Array 2.5-in Drive Bay Chassis (SFF) (Will accept one or two controllers, not I/O modules)	AP839A#0D1

Disk Enclosures

Configuration Information

HP StorageWorks P2000 Dual I/O LFF Drive Enclosure, twelve 3.5" drive bays Used with single or dual controller LFF or SFF array head	AP843A#0D1
HP StorageWorks P2000 LFF Drive Enclosure I/O Module (no cable included. Designed for use with blank LFF chassis AP838A)	AP844A#0D1

Configured Units

HP StorageWorks P2000 G3 MSA FC Dual Controller LFF Modular Smart Array System	AP845A#0D1
HP StorageWorks P2000 G3 MSA FC Dual Controller SFF Modular Smart Array System	AP846A#0D1
HP StorageWorks P2000 G3 MSA FC/iSCSI Dual Combo Controller LFF Array	AW567A#0D1
HP StorageWorks P2000 G3 MSA FC/iSCSI Dual Combo Controller SFF Array	AW568A#0D1

D2700	HP StorageWorks D2700 Disk Enclosure 25 Small Form Factor (SFF) drive bays	AJ941A-#0D1
SAS Drives (SFF 2.5-inch)	HP 146GB 6G SAS 10K 2.5 inch DP ENT HDD	507125-B21
	HP 300GB 6G SAS 10K 2.5 inch DP ENT HDD	507127-B21
	HP 72GB 6G SAS 15K 2.5 inch DP ENT HDD	512545-B21
	HP 146GB 6G SAS 15K 2.5 inch DP ENT HDD	512547-B21
	HP 500GB 6G SAS 7.2K 2.5 inch DP MDL HDD	507610-B21
	NOTE: Go to the HP Hard Drive Compatibility table for complete drive compatibility information (http://www.hp.com/products/harddiskdrives). Using hard drives in unsupported configurations will result in voiding the warranty and could result in damage to the drive and/or loss of data.	

Step 1 - P2000 G3 FC - Base Configuration

Select one:

Model Name	Model Description:	Part Number
HP StorageWorks P2000 Modular Smart Array 3.5-inch Drive Bay Chassis	Controller-less chassis with twelve Large Form Factor (LFF) MSA2 drive bays. Space for two controllers.	AP838A
HP StorageWorks P2000 Modular Smart Array 2.5-inch Drive Bay Chassis	Controller-less chassis with twenty-four Small Form Factor (SFF) ProLiant drives bays. Space for two controllers.	AP839A

There are two array-head chassis - one with twelve 3.5-inch large form factor bays, the other with twenty-four 2.5-inch small form factor drive bays. For an additional twelve drive bays purchase an P2000 3.5-inch Disk Enclosure. You may attach a total of seven P2000 Drive Enclosures for a total of ninety-six LFF drive bays. For 25 additional SFF drive bays purchase D2700 JBOD. You may attach a total of five D2700 JBODs for a total of one hundred and forty nine SFF drive bays. Dual I/O JBODS support both single and dual controller arrays.

Configuration Information

Step 2 - Options

Select each option with quantities specified.

Step 2a - Options

Description with Parts Shipped:	Quantity	Part Number
HP StorageWorks P2000 G3 MSA Fibre Channel Controller (for either the LFF or SFF P2000 or the two DC-powered chassis)	1 or 2	AP836A
HP StorageWorks P2000 G3 MSA FC/iSCSI Combo Modular Smart Array Controller (for either the LFF or SFF P2000 or the two DC-powered chassis)	1 or 2	AP837A

Step 2b - SAS and SATA Drive Options

NOTE: SATA drives are designed for archival or reference data. They should not be used in a heavy or intense I/O environment. Those situations require the use of enterprise-class SAS drives. P2000 3.5-inch drives are for use only with P2000 products.

P2000 Large Form Factor (LFF) SAS drives for P2000 G3 FC and P2000 3.5-inch Disk Enclosure		
HP P2000 300GB 6G SAS 15K rpm LFF (3.5-inch) Dual Port Hard Drive		AP858A
HP P2000 450GB 6G SAS 15K rpm LFF (3.5-inch) Dual Port Hard Drive		AP859A
HP P2000 600GB 6G SAS 15K rpm LFF (3.5-inch) Dual Port Hard Drive		AP860A
MSA2 Large Form Factor (LFF) SATA drives for P2000 array head an P2000 disk enclosure		
HP StorageWorks MSA2 1TB 7.2K 3.5-inch SATA LFF HDD		AJ740A
HP P2000 2TB 3G SATA 7.2K rpm LFF (3.5-inch) Dual Port Hard Drive **NOTE:** This hard drive will be available spring, 2010.	Check avialability	AW556A
ProLiant Small Form Factor (SFF) SAS drives for P2000 G3 Array (24 drive bay) and the D2700 JBOD (25 drive bay)		
HP 146GB 6G SAS 10K 2.5 inch DP ENT HDD		507125-B21
HP 300GB 6G SAS 10K 2.5 inch DP ENT HDD		507127-B21
HP 72GB 6G SAS 15K 2.5 inch DP ENT HDD		512545-B21
HP 146GB 6G SAS 15K 2.5 inch DP ENT HDD		512547-B21
ProLiant Small Form Factor (SFF) SAS MidLine drive for P2000 G3 Array (24 drive bay) and the D2700 JBOD (25 drive bay)		
HP 500 GB 6G SAS 7.2K 2.5 inch SFF DP MDL HDD		507610-B21

Step 2c - Drive Enclosure Options

Use either disk enclosure with Large or Small Form Factor, single or dual controller array heads. Each ship with two .5m mini-SAS to mini-SAS cables.

HP StorageWorks P2000 Dual I/O 3.5-inch 12 Drive Disk Enclosure	AP843A
HP StorageWorks D2700 Dual I/O 2.5-inch 25 Drive Disk Enclosure	AJ941A
HP StorageWorks P2000 Drive Enclosure I/O Module (Only used in conjunction with the P2000 blank chassis (AP838A) if a single I/O disk enclosure is desired. No cable included)	AP844A

Step 2c - SAS Cable Options

miniSAS to miniSAS Cables:
Connecting P2000 G3 FC controller to a JBOD if a longer cable is desired.

HP Ext miniSAS to miniSAS 1m Cable	407337-B21
HP Ext miniSAS to miniSAS 2m Cable	407339-B21

Step 3 - Other MSA2300fc Options

Choose optional Power Cord for Non-U.S. Configurations

NOTE: Shipped standard with all units.

2 ea. Power Cord, 110/220 VAC, US/Canada/Mexico 227099-001

Power Cord, 220/240 VAC, (US/Canada/Mexico)	2	227099-001
Power Cord, (Australia/China/New Zealand)	2	227098-001
Power Cord, (Central Europe)	2	157215-001
Power Cord, (United Kingdom/Hong Kong)	2	157216-001
Power Cord, (Switzerland)	2	157219-001
Power Cord, (Italy)	2	157217-001
Power Cord, (Denmark)	2	157218-001
Power Cord, (Japan)	2	139867-001
Power Cord, (South East Asia/India)	2	157220-001

Step 4 - Choose Supported Options For Fibre Channel Infrastructure

	Model	Description	Part Number
Fibre Channel Host Bus Adapters - X86 servers		QLogic QMH2562 8Gb FC HBA for HP c-Class BladeSystem	451871-B21
		HP BLc Emulex LPe1205- 8Gb FC HBA for HP c-Class BladeSystem	456972-B21
		Lpe1105-HP 4Gb FC HBA for HP c-Class BladeSystem	403621-B21
		QMH2462 4Gb FC HBA for HP c-Class BladeSystem Windows and Linux	403619-B21
		QLogic QMH4062 1GbE iSCSI HBA for HP BladeSystem c-Class, Windows and Linux	488074-B21
	StorageWorks Fibre Channel HBA		
	NOTE: The following is a list of all Fibre Channel Host Bus Adapters for Windows and Linux. For detailed compatibility information please see: http://h18006.www1.hp.com/storage/saninfrastructure/hba.html		
	Brocade Fibre Channel HBAs		
		HP StorageWorks 81B PCI-e FC HBA Single Port	AP769A
		HP StorageWorks 82B PCI-e FC HBA Dual Port	AP770A
		HP StorageWorks 41B 4Gb PCI-e FC HBA	AP767A
		HP StorageWorks 42B 4Gb Dual-Port PCI-e FC HBA	AP768A
	Emulex Fibre Channel HBAs		
		HP StorageWorks 81E PCI-e FC HBA Single Port	AJ762A
		HP StorageWorks 82E PCI-e FC HBA Dual Port	AJ763A
		HP StorageWorks FC2142 4Gb PCI-e HBA	A8002A
		HP StorageWorks FC2242 Dual Channel 4Gb PCI-e HBA	A8003A
	QLogic Fibre Channel HBAs		
		HP StorageWorks 81Q PCI-e FC HBA Single Port	AK344A
		HP StorageWorks 82Q PCI-e FC HBA Dual Port	AJ764A
		HP StorageWorks FC1142 4Gb PCI-e HBA	AE311A
		HP StorageWorks FC1242 Dual Channel 4Gb PCI-e HBA	AE312A
Fibre Channel Host Bus Adapters - Integrity servers	Integrity HP-UX v3 and v2	HP PCI-X 2.0 1Port 4Gb	AB378B
	Integrity HP-UX v3, and v2	HP PCI-X 2.0 2Port 4Gb Fibre Channel HBA	AB379B

	Integrity HP-UX v3 and v2	HP PCIe 2Port 4Gb Fibre Channel HBA	AD300A
	Integrity server blades BL860c and BL870c HP-UX v3 and v2	HP BLc QLogic QMH2462 FC HBA Opt Kit	403619-B21
	Integrity HP-UX v3 and v2	HP PCIe 1Port 4Gb Fibre Channel HBA	AD299A
	Integrity HP-UX v3 and v2	HP PCIe 2-Port 4Gb Fibre Channel HBA	AD335A
	Integrity server blades BL860c and BL870c HP-UX v3	HP BLc Emulex LPe1105 FC HBA Opt Kit	403621-B21
	Integrity HP-UX v3	HP PCIe 1p 4Gb FC and 1p 1000BT Adapter	AD221A
	Integrity HP-UX v3	HP PCIe 2p 4Gb FC and 2p 1000BT Adapter	AD222A
	Integrity HP-UX v3	HP PCIe 2p 4Gb FC and 2p 1000BSX Adapter	AD393A
	Integrity HP-UX v3 and v2	PCI-X 2Gb Fibre Channel/1000Base-SX HBA	A9782A
	Integrity HP-UX v3 and v2	HP PCI-x 1p 4Gb FC and 1p 1000BT Adapter	AD193A
	Integrity HP-UX v3 and v2	HP PCI-x 2p 4Gb FC and 2p 1000BT Adapter	AD194A
Fibre Channel Switches	HP StorageWorks 8/8 Base SAN Switch		AM866A
	HP StorageWorks 8/8 SAN Switch		AM867A
	HP StorageWorks 8/24 Base SAN Switch		AM868A
	HP StorageWorks 8/40 Base SAN Switch		AM869A
	HP StorageWorks 8/40 Power Pack+ SAN Switch		AM870A
	HP StorageWorks 8/80 Power Pack+ SAN Switch		AM872A
	HP StorageWorks 8/80 Base SAN Switch		AM871A
	HP StorageWorks 1606 Power Pack+ Extension SAN Switch		AP864A
	HP StorageWorks 1606 Full Extension SAN Switch		AP863A
	HP StorageWorks 1606 Base Extension SAN Switch		AP862A
	HP StorageWorks 2408 FCoE Base Converged Network Switch		AP801A
	HP StorageWorks 2408 FCoE Power Pack+ Converged Network Switch		AP802A
	HP StorageWorks Encryption SAN Switch		AR944A
	HP StorageWorks 4/256 SAN Director		A7988A
	HP StorageWorks 4/256 Power Pack SAN Director		A7989A
	HP StorageWorks DC SAN Backbone Director		AK857A
	HP StorageWorks DC04 Power Pack+ SAN Director		AR479A
	HP StorageWorks DC04 SAN Director		AR478A
	Brocade 8/12c SAN Switch for HP BladeSystem c-Class		AJ820A
	Brocade 8/24c SAN Switch for HP BladeSystem c-Class		AJ821A
	Brocade 8/24c SAN Switch for HP BladeSystem c-Class Power Pack+		AJ822A
	8 Gb Simple SAN Connection		
	HP StorageWorks 8/20q Fibre Channel Switch (8 switch ports active)		AQ233A
	HP StorageWorks 8Gb Simple SAN Connection Kit (8 switch ports active)		AK241A

	HP StorageWorks 8/20q Fibre Channel Switch (16 switch ports active)	AK242A
	HP SN6000 Stackable 8Gb 24-port sgl pwr supply FC Switch	AW575A
	HP SN6000 Stackable 8Gb 24-port dual pwr supply FC Switch	AW576A
	Cisco MDS 9124 8-ports Active Fabric Switch	AG646A
	Cisco MDS 9124 16-ports Active Fabric Switch	AG647A
	Cisco MDS 9124 24-ports Active Fabric Switch	AG648A
	Cisco MDS 9124e 12-port Fabric Switch for HP c-Class BladeSystem	AG641A
	Cisco MDS 9124e 24-port Fabric Switch for HP c-Class BladeSystem	AG642A
	Cisco MDS 9134 24-ports Active Fabric Switch	AG874A
	Cisco MDS 9134 32-ports Active Fabric Switch	AG875A
	Cisco MDS 9134 26-ports Active w/kit for 48 port solution	AJ732A
	Cisco MDS 9134 34-ports Active w/kit for 64 port solution	AJ733A
	MDS 9222i Multiservice Modular Switch w/0 SFPs	AG851A
	Cisco MDS 9216i w/o Ethernet SFP switch	AE390A
	Cisco MDS 9216i	AE390A
	MDS 9506 Director with Supervisor 2	AE388A
	MDS 9509 Director with Supervisor 2	AE389A
	MDS 9513 Director with Supervisor 2	AE376A
	MDS 9513 Director with Fabric 2 Module	AJ905A
Fibre Channel Cables	2 m LC-LC Multi-Mode Fibre Channel Cable	221692-B21
	5 m LC-LC Multi-Mode Fibre Channel Cable	221692-B22
	15 m LC-LC Multi-Mode Fibre Channel Cable	221692-B23
	30 m LC-LC Multi-Mode Fibre Channel Cable	221692-B26
	50 m LC-LC Multi-Mode Fibre Channel Cable	221692-B27
	2 m LC-SC Multi-Mode Fibre Channel Cable	221691-B21
	5 m LC-SC Multi-Mode Fibre Channel Cable	221691-B22
	15 m LC-SC Multi-Mode Fibre Channel Cable	221691-B23
	30 m LC-SC Multi-Mode Fibre Channel Cable	221691-B26
	50 m LC-SC Multi-Mode Fibre Channel Cable	221691-B27

Step 5 - Choose Rack Options

Select each required option with quantities specified.

Rack Cabinet, Customer Assembled	
5642 - 5000 Series rack	358254-B21
14U rack	
HP S10614 Rack with Shock Pallet	292302-B22
Rack Cabinets 10622 G2	
10622 G2 Universal Rack w/Shock Pallet	AF022A
10622 G2 Universal Rack w/Standard Pallet	AF021A
Rack Cabinets under 10636 G2	
10636 G2 (36U) Rack Cabinet - Pallet	AF011A
10636 G2 (36U) Rack Cabinet - Shock Pallet	AF012A
10636 G2 (36U) Rack Cabinet - Crated	AF013A
10636 G2 (36U) Rack Cabinet, with Extension - Shock Pallet	AF014A
Rack Cabinets 10642 G2	
10642 G2 (42U) Rack Cabinet - Pallet	AF001A
10642 G2 (42U) Rack Cabinet - Shock Pallet	AF002A
10642 G2 (42U) Rack Cabinet - Crated	AF003A
10642 G2 (42U) Rack Cabinet, with Extension - Shock Pallet	AF004A
Modular Cooling System G2 (MCS G2)	AF025A
MCS G2 10642 G2 Expansion Rack	AF026A
Rack Cabinets 10842 G2	
10842 G2 Universal Rack w/Shock Pallet	AF042A
10842 G2 Universal Rack w/Standard Pallet	AF041A
Rack Cabinets 10647 G2	
10647 Rack G2 Pallet	AF031A

P2000 G3 FC **P2000 G3 FC/iSCSI**	**POWER REQUIREMENTS**	
	Input Power Requirements (typical-running I/O)	• 8G FC (2 Port - 8G FC) 110 VAC ; 3.7A,370W 220VAC. 1.7A,408W • FC/iSCSI Combo (2 Port- 8G FC + 2 Port - 1G iSCSI) 110 VAC ; 3.9A,390W 220VAC. 1.7A,408W
	Max Input Power	100-240 VAC, 50/60 Hz., 4.5-1.9A; 48-60 VDC 10.4A/8.3A
	Heat Dissipation	1622 BTU/hr
	TEMPERATURE AND HUMIDITY RANGES	
	Operating Temperature	41°F to 104°F (5°C to 40°C)
	Shipping Temperature	-40°F to 158°F (-40°C to 70°C)
	Operating Humidity	10% to 90% RH @ 104°F (40°C) non-condensing
	Non-Operating Humidity	Up to 93% RH @ 104°F (40°C)
	DECLARED ACOUSTIC NOISE LEVELS	
	Sound Power	A weighted sound power LWAd=6,75 B
	Sound Pressure	A weighted sound pressure LpAm - 55dB
	SHOCK AND VIBRATION	
	Shock, Operational	10G's for 10 milliseconds
	Shock, Non-Operational	15G 11ms half sine
	Vibration, Operational	5-500Hz, 0.21Grms flat
	Vibration, Non-Operational	3-365-3Hz, 1.22 Grms,z-axis,0.85 Grms, X&Y axis shaped spectrum
	PHYSICAL	
	Height	3.5 in/ 8.9 cm
	Depth (excluding cables) (back of ear to back of controller handle)	P2000 G3 FC SFF 24-bay array: 20.28 in / 51.510 cm P2000 G3 FC LFF 12-bay array: 21.3 in. / 55.1 cm
	Width (body only)	17.6 in / 44.7 cm (w/ ears 19 in / 48.26 cm)
	Chassis Weight (no controllers)	P2000 LFF chassis: 44 lbs. P2000 SFF chassis: 43 lbs

P2000 G3 FC and FC/iSCSI Combo Controller	**User Interface**	Status and activity provided via management interfaces. Status Indicators on front of Controller
	RAID Support	0, 1, 3, 5, 6, 10, 50
	Cache Memory	1GB Read/Write. ECC protection with backup to Flash memory (indefinite backup)
	Cache Backup	ECC protection with back up to flash memory (indefinite backup)
	Upgradeable Firmware	yes
	Disk Drive and Enclosure Protocol Support	6 Gb SAS - Serial Attached SCSI
	Expansion Port	SAS (SFF8088) 4x lane 6 Gb SAS

Technical Specifications

P2000 G3 Regulatory Info	**Safety**	UL 60950-1 (USA)
		CAN/CSA-C22.2 No.60950-1-03 (Canada)
		EN 60950-1 (European Union)
		GS mark (Germany)
		IEC 60950-1 (International)
		CCC Mark (power supply only, China PRC)
	Electromagnetic Compatibility	VCCI:2008-04 Class A (Japan)
		FCC 15:109(g) Class A (USA)
		ICES-003:2004 Class A (Canada)
		EN55022 : (European Union Class A); CISPR 22 (International Class A)
		EN61000-3-2 : (Harmonics) (European Union)
		EN61000-3-3 : (Flicker) (European Union)
		EN 55024 (European Union, Immunity, Class A);CISPR 24 (International Immunity, Class A)
		AS/NZS CISPR 22, Class A (Australia, New Zealand)
		CNS 13438 Taiwan, Class A (Taiwan)
		KN22 Class A (Emissions Class A); KN24 (Immunity) (S Korea)
	RoHS and WEEE	RoHS-6/6 Compliance, China RoHS, WEEE
	Country Approvals	United States ,Australia/New Zealand, Canada, China (PRC), European Union, Germany (GS Mark), Japan, South Korea, Taiwan

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